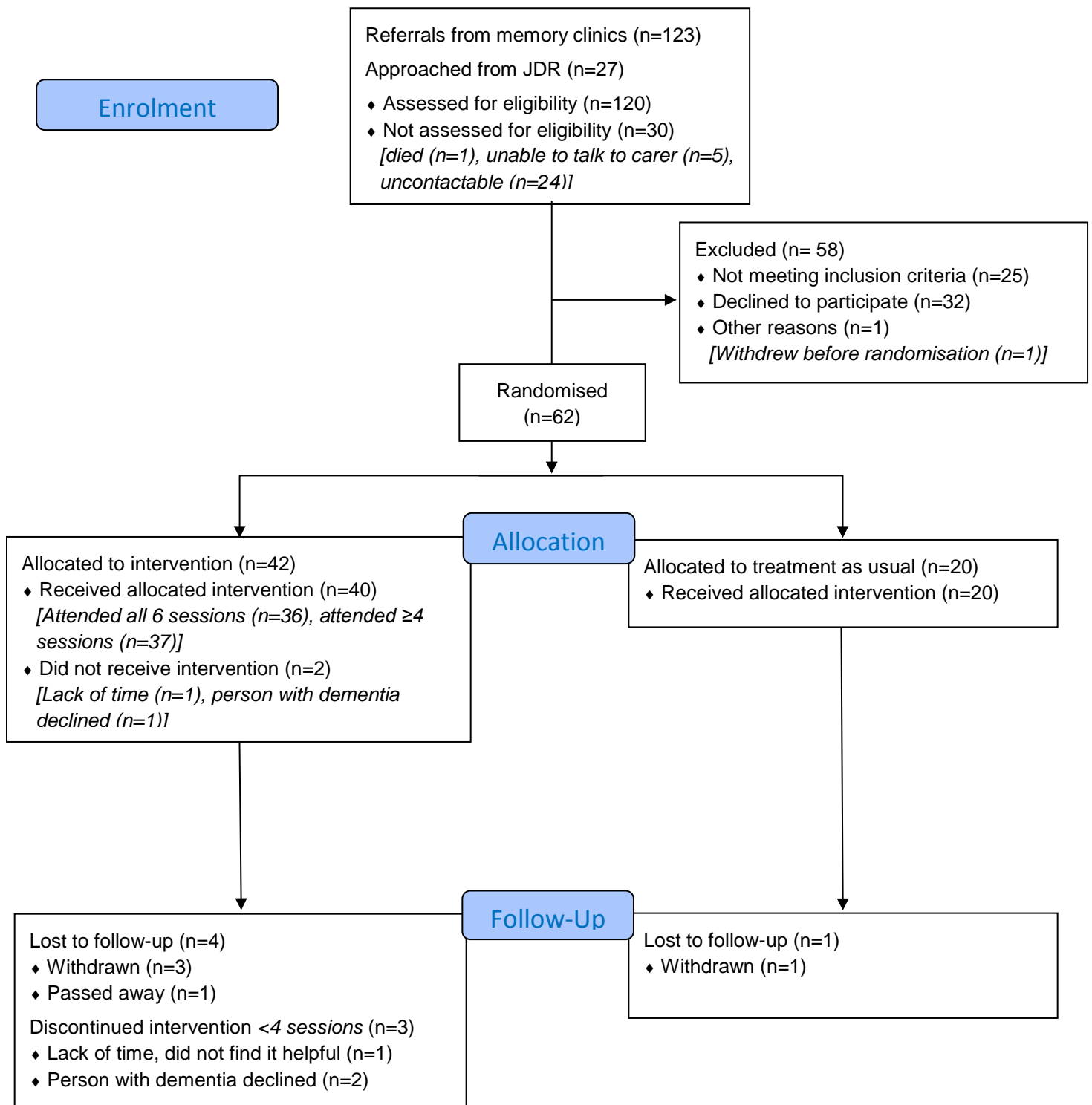


1. Participant flow

CONSORT Flow Diagram: Summary of recruitment and follow-up



2. Baseline characteristics

The sociodemographic characteristics of the person with dementia and their family carer are summarised in the table below.

.Baseline Demographic Data and Diagnostic Characteristics by Randomised Group

PERSON WITH DEMENTIA		Intervention (N=42)	TAU (N=20)
Sex	Male	9 (21%)	10 (50%)
	Female	33 (79%)	10 (50%)
Age (years)	Mean (SD)	80.4 (9.0)	79.6 (7.0)
Lived with/alone	Family carer	28 (67%)	17 (85%)
	Another family member	3 (7%)	1 (5%)
	Paid carer	5 (12%)	1 (5%)
	Alone	6 (14%)	1 (5%)
Diagnosis	Alzheimer's disease	22 (52%)	7 (35%)
	Dementia with Lewy bodies	2 (5%)	3 (15%)
	Mixed	8 (19%)	4 (20%)
	Vascular dementia	8 (19%)	6 (30%)
	Alcohol-related dementia	1 (2%)	0 (0%)
	Unspecified	1 (2%)	0 (0%)
Age left education (years)	Mean (SD)	15.7 (3.7) (N=40)	16.4 (4.9) (N=19)
Marital status	Single	1 (2%)	1 (5%)
	Married	17 (40%)	11 (55%)
	Divorced	1 (2%)	0 (0%)
	Widowed	23 (55%)	8 (40%)

Ethnic group	White	27 (64%)	13 (65%)
	Asian	3 (7%)	3 (15%)
	Black	7 (17%)	2 (10%)
	Other	5 (12%)	2 (10%)
CDR global	Very mild	5 (12%)	3 (15%)
	Mild	16 (38%)	6 (30%)
	Moderate	18 (43%)	9 (45%)
	Severe	3 (7%)	2 (10%)
CARER		Intervention (N=42)	TAU (N=20)
Carer sex	Male	10 (24%)	8 (40%)
	Female	32 (76%)	12 (60%)
Carer age (years)	Mean (SD)	56.15 (13.54)	59.09 (12.22)
Family carer co-resident	Yes	28 (67%)	17 (85%)
Relationship to person with dementia	Spouse	10 (24%)	9 (45%)
	Child/Child in law	30 (72%)	11 (55%)
	Grandchild	1 (2%)	0
	Friend	1 (2%)	0
Carer ethnicity	White	29 (69%)	14 (70%)
	Asian	3 (7%)	3 (15%)
	Black	7 (17%)	1 (5%)
	Other	3 (7%)	2 (10%)

Notes: The numbers are frequency (%) unless otherwise stated.

3. Outcome measures

Primary and secondary outcomes are summarised in the tables below.

Primary outcomes

	Number	Percentage	95% Confidence intervals
Eligible referrals consenting	63	66	56-76
Eligible referrals randomised	62	65	55-75
Adherence of randomised participants (attending ≥ 4 sessions)	37	88	75-96

Secondary outcomes -Scores of baseline and three month follow-up patient and carer validated interview measures by randomised group

PERSON WITH DEMENTIA baseline		Intervention (N=42)	TAU (N=20)
SDI global score	Median (IQR)	2.57 (1.35 to 3.67)	2.98 (1.85 to 3.96)
SDI total score	Median (IQR)	26.5 (19 to 36)	32.5 (20.5 to 40)
ESS total score	Mean (SD)	9.95 (6.02)	8.85 (6.31)
NPI total score	Mean (SD)	42.02 (23.17) (N=41)	46.90 (23.48)
DEMQOL-Proxy	Mean (SD)	87.57 (10.73)	88.51 (10.14)
CARER baseline		Intervention (N=42)	TAU (N=20)
PSQI global score	Mean (SD)	9.22 (4.08) (n=41)	10.40 (4.52)
SCI total score	Mean (SD)	15.32 (8.22) (n=41)	13.50 (5.92)
HADS scores	Anxiety: Mean (SD)	8.17 (4.66)	9.30 (3.80)

Depression: Mean (SD)			5.24 (4.33)	7.65 (4.60)	
Total: Mean (SD)			13.40 (8.35)	17.05 (7.80)	
ZBI score	Mean (SD)		37.69 (18.39)	38.30 (19.27)	
HSQ scores	Physical health: Mean (SD)		67.89 (32.79) (n=41)	52.50 (39.47)	
	Mental health: Mean (SD)		60.95 (23.17)	52.33 (24.02)	
PERSON WITH DEMENTIA three month			Intervention (N=42)	TAU (N=20)	Adjusted Tr effect (I-TAU) (95% CI)*
SDI global score	Median (IQR)		0.92 (0.49 to 2.94)	2.43 (0.82 to 3.88)	-0.30 (-1.42 to 0.82) ^a
SDI total score 0 to 84	Median (IQR)		16 (9 to 29) (n=38)	30 (14 to 37) (n=18)	-7 (-17.53 to 3.53) ^a
ESS total score	Mean (SD)		7.17 (5.87) (n=36)	9.00 (7.55) (n=18)	-2.86 (-5.54 to -0.17) (n=54)
DEMQOL-Proxy	Mean (SD)		93.52 (10.12) (n=37)	87.07 (10.22) (n=18)	7.08 (2.25 to 11.91) (n=55)
NPI total score	Mean (SD)		38.69 (23.57) (n=36)	44.72 (23.22) (n=18)	-1.99 (-11.66 to 7.68) (n=54)
CARER three months			Intervention (N=42)	TAU (N=20)	Adjusted Tr effect (I-TAU) (95% CI)*
PSQI global score	Mean (SD)		9.37 (4.16) (n=38)	9.5 (4.49) (n=18)	1.03 (-1.05 to 3.11) (n=55)
SCI total score	Mean (SD)		15.45 (7.45) (n=38)	14.53 (8.54) (n=19)	-0.41 (-3.75 to 2.93) (n=56)
HADS scores	Anxiety	Mean (SD)	8.76 (5.57)	9.05 (4.22)	1.13 (-0.31 to 2.56)
	Depression	Mean (SD)	5.71 (4.43)	8.79 (4.88)	-1.05 (-3.01 to 0.91)

Total		Mean (SD)	14.47 (9.20) (n=38)	17.84 (8.43) (n=19)	0.51 (-2.39 to 3.42) (n=57)
ZBI score		Mean (SD)	36.5 (17.07) (n=38)	42.16 (16.45) (n=19)	-5.32 (-9.83 to -0.82) (n=57)
HSQ scores	Physical Health	Mean (SD)	68.42 (32.60) (n=38)	54.39 (35.94) (n=19)	3.12 (-12.27 to 18.52) (n=57)
	Mental Health	Mean (SD)	55.96 (26.19) (n=38)	48.07 (21.15) (n=19)	1.25 (-9.52 to 12.02) (n=57)

Notes: *Estimates are from models adjusted for baseline score and site. Regression is OLS unless otherwise indicated: ^aQuantile (median) regression

Three month sleep and non-parametric circadian rhythm analysis measures by randomised group

		Intervention	TAU	Adjusted Tr effect (I-TAU) (95% CI)*
Sleep measures		N=32	N=17	N=49
Sleep efficiency (%) ^	Median (IQR)	76.05 (65.0 to 81.9)	78.6 (72.1 to 82.3)	0.39 (-4.89 to 5.68) ^a
Average sleep time (mins)	Median (IQR)	418.5 (383.5 to 506)	475 (396 to 534)	
Average wake time (mins)	Median (IQR)	112.5 (94.5 to 157.5)	105 (88 to 133)	
Average time of lights out/bedtime (24h)*	Median (IQR)	22:15 (21:36 to 22:50)	22:03 (21:21 to 23:28)	
Average time of falling asleep (24h)*	Median (IQR)	22:49 (21:59 to 23:23)	22:22 (21:39 to 23:55)	
Average time of waking up (24h)	Median (IQR)	08:04 (07:16 to 08:38)	08:09 (07:38 to 08:41)	
Average time of getting up (24h)	Median (IQR)	08:06 (07:20 to 08:44)	08:17 (07:48 to 08:43)	
Average time in bed (hours)	Mean (SD)	9.89 (1.83)	10.05 (1.83)	
Non-parametric circadian rhythm analysis measures		N=34	N=17	N=51
Relative amplitude	Median (IQR)	0.71 (0.49 to 0.87)	0.76 (0.51 to 0.90)	-0.02 (-0.10 to 0.06) ^a
Inter-daily stability	Mean (SD)	0.38 (0.18)	0.47 (0.19)	
Intra-daily variability	Mean (SD)	1.04 (0.38)	0.98 (0.40)	

L5 - average activity count for 5 most restful hours	Median (IQR)	1067 (621 to 2003)	981 (493 to 1940)	76.88 (-521.40 to 675.16) ^a
Start hour of 5 most restful hours (24h)*	Median (IQR)	01:00 (00:00 to 03:00)	01:00 (01:00 to 02:00)	
M10 - average activity count for 10 most active hours	Median (IQR)	8247 (4258 to 12155)	8132 (5960 to 17158)	-198.29 (-1717.83 to 1321.25) ^a
Start hour of 10 most active hours (24h)	Median (IQR)	10:00 (8:00 to 11:00)	9:00 (8:00 to 10:00)	
Core night-time sleep measures		N=32	N=17	
Sleep efficiency (%) ^	Median (IQR)	79.0 (63.75 to 82.6)	80.9 (69.8 to 86.5)	
Average sleep time (mins)	Median (IQR)	285 (243 to 303) (n=30)	291 (251 to 311) (n=17)	
Average wake time (mins)	Median (IQR)	62 (43 to 80) (n=30)	49 (39 to 70) (n=17)	

Notes. Sleep and core night-time measures are only for those with at least 7 nights of data available. NPCRA (non-parametric circadian rhythm analysis) data are those calculated with all 24h periods

with >3hrs of missing data excluded. * to calculate summaries, times have been ordered as night time i.e. from midday to midday the following day.

*Estimates are from models adjusted for baseline score and site. Regression is OLS unless otherwise indicated: ^aQuantile (median) regression

^^ time asleep\time in bed

4. Adverse events

Adverse events are summarised in the table below

. Summary of comorbid illness and side Effects by Randomised Group

	Intervention	TAU
Baseline	(N=42)	(N=20)
Falls	17 (40%)	7 (35%)
Gastro	21 (50%)	9 (45%)
Neurological	19 (45%)	10 (50%)
Infections	14 (34%)	6 (30%)
Other	6 (14%)	2 (11%)
3 months	(N=38)	(N=18)
Falls	16 (42%)	7 (39%)
Gastro	16 (42%)	4 (22%)
Neurological	15 (39%)	10 (56%)
Infections	18 (47%)	5 (28%)
Other	9 (24%)	9 (50%)

Notes: The numbers are frequency (%)

